

Examiner's amendments
~~AMENDMENTS TO THE CLAIMS:~~

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A multi-tone communication device with a transmit path and a receive path ~~coupled~~ configured to couple to a communication medium and with the transmit path and the receive path including transmit components and receive components respectively, ~~and~~ the communication device comprising:

a training module for transmitting on the ~~transmission~~ transmit path a training sequence comprising pairs of tones transmitted on the transmit path ^{resulting in} ~~an intermodulation of~~ which generates a single tone corresponding with a monitor signal on the receive path;

a controller for controlling variations of at least one control parameter of at least a selected one of the transmit components during the transmission of the training sequence by the training module;

a tone detector on the receive path to detect levels of the monitor signal; and

a processor which utilizes the detected levels of the monitor signal to determine which among the variations of the at least one control parameter minimizes leakage between the transmit path and the receive path.

2. (Canceled)

2. ~~3.~~ (Previously Added) The communication device of Claim 1, ~~with the controller further for~~ ^{detected} controlling the locking of the at least one control parameter at the ~~level~~ ^{detected} determined by the processor to minimize leakage during subsequent operation of the communication device.

4. (Canceled)

- 7 ~~8.~~ (Currently Amended) The An X-DSL communication device of Claim 1, wherein the training sequence comprises: with a transmit path and a receive path configured to couple to a communication medium and with the transmit path and the receive path including transmit components and receive components respectively, and the X-DSL communication device comprising:

a training module for transmitting on the transmit path a training sequence comprising pairs of tones distributed across a downstream set of X-DSL tones ^{resulting in} an intermodulation of which generates a single tone corresponding with the a monitor signal within an upstream set of X-DSL tones;

a controller for controlling variations of at least one control parameter of at least a selected one of the transmit components during the transmission of the training sequence by the training module;

a tone detector on the receive path to detect levels of the monitor signal; and

a processor which utilizes the detected levels of the monitor signal to determine which among the variations of the at least one control parameter minimizes leakage between the transmit path and the receive path.

- 3 ~~8.~~ (Previously Added) The communication device of Claim 1, wherein the controller controls variations of at least one of, a bias voltage, an input voltage and a temperature of a selected amplification component within the transmit path of the communication device.

- 4 ~~8.~~ (Currently Amended) The communication device of Claim 1, further comprising on the receive path:

an analog-to-digital converter (ADC) for digitizing the monitor signal;

the tone detector coupled to the ~~ACD~~ ADC for detecting an amplitude of the monitor signal; and

a memory for storage by the processor of the amplitude of the monitor signal and variations of the at least one control parameter corresponding thereto.

5 ~~8~~. (Previously Added) The communication device of Claim 1, wherein the communication medium comprises one of: a wired medium and a wireless medium.

6 ~~8~~. (Previously Added) The communication device of Claim 1, wherein the communication device comprises one of: a physical modem and a logical modem.

8 ~~10~~. (Currently Amended) ~~The A communication device of Claim 1, further comprising: with~~
a transmit path and a receive path configured to couple to a communication medium and
with the transmit path and the receive path including transmit components and receive
components respectively, and the communication device comprising:

a training module for transmitting on the transmit path a training sequence which
generates a monitor signal on the receive path;

a controller for controlling variations of at least one control parameter of at least a
selected one of the transmit components during the transmission of the training sequence by
the training module;

a tone detector on the receive path to detect levels of the monitor signal; and

a processor which utilizes the detected levels of the monitor signal to determine which
among the variations of the at least one control parameter minimizes leakage between the
transmit path and the receive path; and

an error detector for detecting a difference between an actual level of the monitor
signal from the ADC and an estimated level of the monitor signal as estimated by the
processor based on a leakage model of the leakage from the transmit path to the receive path
together with an initial device model; and

the processor both updating the initial device ^{model} to offset the ^{difference} error and subsequently
generating an inverse channel model for predistorting signals on the transmission transmit
path to linearize the output of the communication device.

11. (Currently Amended) A method for ~~configuring an output of~~ operating a multi-tone communication device with a transmit path and a receive path ~~coupled~~ configured to couple to a communication medium and with the transmit path and receive path including transmit components and receive components respectively; ~~and the method comprising:~~

transmitting on the ~~transmission~~ transmit path a training sequence comprising selected
pairs of tones distributed across a downstream set of tones, ^{resulting in} an intermodulation of which
generates a single tone corresponding with a monitor signal on the receive path;

9 varying a level of at least one control parameter of at least a selected one of the
transmit components during said ~~act of~~ transmitting; ^{step}

monitoring during the varying ^{step} ~~act~~ the monitor signal on the receive path;

determining on the basis of the monitoring of the monitor signal the level of the at
least one control parameter which minimizes the leakage of ^{the} training sequence onto the
receive path; and

^{step}
utilizing the level of the at least one control parameter determined in said determining
act during subsequent transmissions.

12. (Canceled)

16 13. (Currently Amended) The A method for ~~configuring~~ operating of Claim 11, wherein
the ~~transmitting act~~ further comprises the act of: an X-DSL communication device with a
transmit path and a receive path configured to couple to a communication medium and with
the transmit path and the receive path including transmit components and receive components
respectively, and the method comprising:

transmitting on the transmission path a training sequence comprising selecting
selected pairs of tones distributed across a downstream set of X-DSL tones an
intermodulation of which generates a single tone corresponding with ~~the a~~ monitor signal
within an upstream set of X-DSL tones;

varying a level of at least one control parameter of at least a selected one of the
transmit components during said ~~act of~~ transmitting; ^{step}

monitoring during the varying ^{step} ~~act~~ the monitor signal on the receive path;
determining on the basis of the monitoring of the monitor signal the level of the at
least one control parameter which minimizes the leakage of ^{the} ~~the~~ training sequence onto the
receive path; and
utilizing the level of the at least one control parameter determined in said determining
^{step} ~~act~~ during subsequent transmissions.

12 ~~14~~ (Currently Amended) The method ~~for configuring~~ of Claim 11, wherein the selected one of the transmit components includes an amplifier and wherein the at least one control parameter ~~of the amplifier varied~~ ^{is} in said varying ^{step} ~~act~~ includes at least one of: a bias voltage, an input voltage, and a temperature.

13 ~~15~~ (Currently Amended) The method ~~for configuring~~ of Claim 11, wherein the monitoring ^{step} ~~act~~ further comprises the ^{steps} ~~acts~~ of:

digitizing the monitor signal received on the receive path;

detecting an amplitude of the monitor signal; and

storing the amplitude of the monitor ^{signal} ~~tone~~ detected in the detecting ^{step} ~~act~~ for each variation of the level of the at least one control parameter during said ~~act~~ ^{step} ~~of transmitting the~~ training sequence.

14 ~~16~~ (Previously Added) The method of Claim 11, wherein the communication medium comprises one of: a wired medium and a wireless medium.

15 ~~17~~ (Previously Added) The method of Claim 11, wherein the communication device comprises one of: a physical modem and a logical modem.

17 ~~18~~ (Currently Amended) ~~The method of Claim 11, further comprising the acts following the utilizing act of:~~ A method for operating a communication device with a transmit path and a receive path configured to couple to a communication medium and with the transmit path

and the receive path including transmit components and receive components respectively, and the method comprising:

transmitting on the transmission path a training sequence which generates a monitor signal on the receive path;

varying a level of at least one control parameter of at least a selected one of the transmit components during said ^{step}act of transmitting;

monitoring during the varying ^{step}act the monitor signal on the receive path;

determining on the basis of the monitoring of the monitor signal the level of the at least one control parameter which minimizes the leakage of ^{the}training sequence onto the receive path;

^{step}act utilizing the level of the at least one control parameter determined in said determining ^{act}during subsequent transmissions;

estimating the level of the monitor signal throughout the training sequence using a device model table for the components on the transmit and receive paths;

retransmitting the training sequence;

monitoring during the retransmitting ^{step}act an actual level of the monitor signal on the receive path;

determining an error between the level of the monitor signal estimated in the estimating ^{step}act and the actual level monitored in the monitoring ^{step}act and updating the device ^{model}table accordingly;

generating an inverse channel model to linearize an output of the transmit path utilizing the device model table; and

predistorting signals transmitted ⁱⁿby the ~~transmission~~ ^{step}transmit path utilizing the inverse channel model generated in the generating ^{act}act.

- 20 19. (Currently Amended) A means for configuring ~~an output of a multi-tone~~ communication device with a transmit path and a receive path ~~coupled~~ configured to couple to a communication medium and with the transmit path and the receive path including transmit components and receive components respectively, ~~and~~ the means comprising:
- means for transmitting on the ~~transmission~~ transmit path a training sequence which ~~comprises pairs of tones distributed across a downstream set of tones~~ ^{resulting in} an intermodulation of which generates a single tone corresponding with a monitor signal within an upstream set of tones received on the receive path;
- means for varying a level of at least one control parameter of at least a selected one of the transmit components during the training sequence;
- means for monitoring ⁱⁿ ~~during~~ the varying ^{means} ~~of~~ the monitor signal on the receive path;
- means for determining on the basis of the monitoring of the monitor signal the level of the at least one control parameter which minimizes the leakage of training sequence onto the receive path; and
- means for utilizing the level of the at least one control parameter determined in said determining ^{means} ~~of~~ during subsequent transmissions.

20. (Canceled)

21. (Previously Added) The means for configuring of Claim 19²⁰, wherein the ~~training sequence comprises~~ ^{are} pairs of tones distributed across a downstream set of X-DSL tones ~~an intermodulation of which generates a single tone corresponding with the monitor signal~~ ^{and the} ~~within an upstream set of X-DSL tones received on the receive path.~~

- 9 22. (New) The communication device of Claim 10⁸, wherein the communication medium comprises one of: a wired medium and a wireless medium.

- 10 23. (New) The communication device of Claim 10⁸, wherein the communication device comprises one of: a physical modem and a logical modem.

¹⁷
18 ~~24~~. (New) The method of Claim ~~18~~, wherein the communication medium comprises one of: a wired medium and a wireless medium.

¹⁷
19 ~~25~~. (New) The method of Claim ~~18~~, wherein the communication device comprises one of: a physical modem and a logical modem.